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A REVISION OF THE GRASSHOPPER GENERA *CHROMACRIS* AND *XESTOTRACHELUS* (ORTHOPTERA, ROMALEIDAE, ROMALEINAE)

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ABSTRACT: **Illustrations, diagnoses, and distributional records are given for 14 species and subspecies of the Neotropical grasshopper genera *Chromacris* and *Xestotrachelus*, of which 1 species, *Chromacris minuta*, and 2 subspecies, *C. trogon intermedia* and *C. psittacus pacificus*, are described as new, and 4 names are newly synonymized. Known information concerning food plants, oviposition, habitat, and predator defense for *Chromacris speciosa* is briefly reviewed. (Orthoptera, Romaleidae, Romaleinae, grasshoppers, Neotropical, new taxa, taxonomic revision)**

INTRODUCTION

The grasshopper species of the genus *Chromacris* are of a striking color, usually a glossy green with yellow markings, and red or yellow wings. They occur in the humid areas of the American tropics from Mexico to Argentina. As a general rule, but one species occurs at any one locality. Adults are usually seasonal in their appearance, so that some months of the year a species may appear to be absent from a local fauna. Because most of the taxa of the genus have been poorly defined or understood, the application of a number of their names has been uncertain, and there has been no comprehensive treatment of the genus, a revisionary study appeared to be needed for this common and widespread group of grasshoppers. The monotypic genus *Xestotrachelus* of southern South America is included in this study because of its similarity to *Chromacris* and because it is the only closely related genus.

The subfamily Romaleinae currently includes about 48 genera. Rehn and Grant (1959) erected 16 tribes in this subfamily and proposed the tribe Chromacrini for the genera *Chromacris* and *Xestotrachelus*. Because 10 of their tribes include but one or two genera each, and they give no distinguishing characters for these tribes, it does not appear useful to recognize the tribe Chromacrini and other such tribes of the subfamily.

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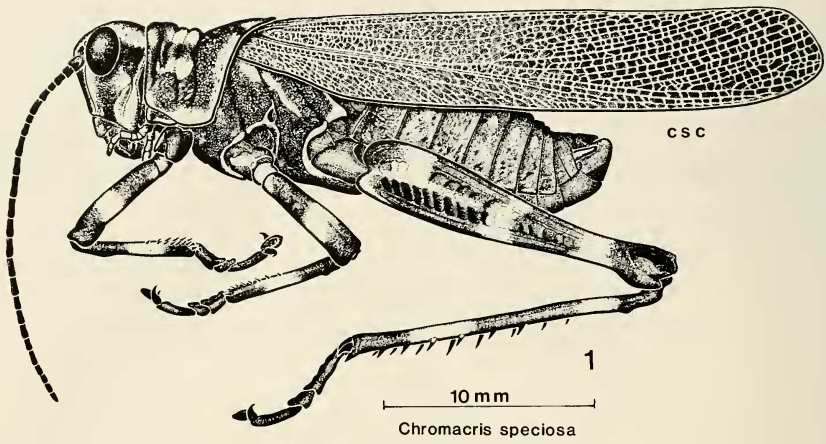

FIGURE 1. *Chromacris speciosa*, Casupa, Florida, Uruguay.

The genus *Chromacris* includes at least eight species, two of which are polytypic, each having two subspecies, and two other species that we tentatively recognize pending further information. One species, *C. minuta*, and two subspecies, *C. trogon intermedia* and *C. psittacus pacificus*, are described as new. There are five junior synonyms, three of which we newly synonymize.

Specimens belonging to various collections are indicated by the following abbreviations: ANSP, Academy of Natural Sciences of Philadelphia; CACS, Dr. C. A. Campos Seabra Collection; CSC, Carlos S. Carbonell Collection, Montevideo, Uruguay; CHFR, C. H. F. Rowell Collection, Zoologisches Institut der Universität, Basel, Switzerland; FCZ, F. Carrasco Collection, Cuzco, Peru; MNHN, Muséum National d'Histoire Naturelle, Paris, France; MZSP, Museu de Zoologia, Universidade São Paulo, Brazil; UMMZ, University of Michigan Museum of Zoology, Ann Arbor, Michigan, U.S.A.

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We are grateful to our many friends for their help and advice. We especially thank the following persons and their respective institutions for the loan of specimens. Dr. Irving J. Cantrall, UMMZ; Drs. F. Carrasco and J. A. Escalante, University of Cuzco, Peru; Dr. Marius Descamps and Christiane Amedegnato, MNHN; Dr. Kurt K. Günther, Museum für Naturkunde, Humboldt Universität, Berlin, DDR; and the late Dr. H. Reichardt, MZSP.

Species List

In the following list of taxa we have attempted to place similar or related taxa as close to one another as practical. The number assigned to each taxon matches the number in the text. Junior synonyms are given (in italics) below each numbered taxon.

1. **Chromacris colorata** (Serville)
   Rhomalea pedes Pictet and Saussure
2. **Chromacris minuta** n.sp.
3. **Chromacris miles** (Drury)
4. **Chromacris speciosa** (Thunberg)
   Acridium xanthopterum Hahn
   Rhomalea stolli Pictet and Saussure
5. **Chromacris nuptialis** (Gerstaecker)
   Rhomalea latipennis Pictet and Saussure
6. **Chromacris trogon trogon** (Gerstaecker)
7. **Chromacris trogon intermedia** n.subsp.
8. **Chromacris psittacus psittacus** (Gerstaecker)
9. **Chromacris psittacus pacificus** n.subsp.
10. **Chromacris icterus** (Pictet and Saussure)
    Rhomalea opulenta Gerstaecker
11. **Chromacris peruviana** (Pictet and Saussure)
12. **Xestotrachelus robustus** (Bruner)
    Xestotrachelus hasemani Bruner

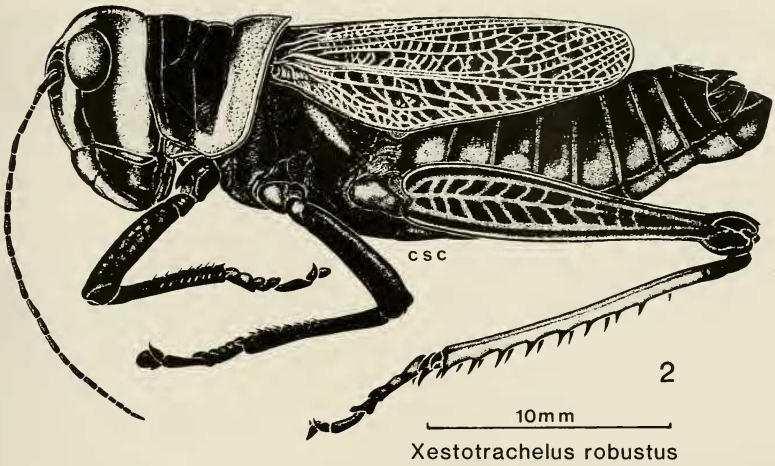


FIGURE 2. *Xestotrachelus robustus*, Chapada dos Guimarães, Mato Grosso, Brazil.

KEY TO SPECIES OF *CHROMACRIS*

1. Exterior of small aedeagus membranous (Figs. 19–20). First two plaits or anterior fold of wings entirely black to base (Figs. 3–6). Colorata group 2
1′. Exterior of aedeagus sclerotized forming a short collarlike structure around the phallotreme opening (Figs. 22–25). First two plaits or anterior fold of wings yellow on basal half (Figs. 7–9), or some black on basal half of first plait (Fig. 10). Trogon group 6

2(1). Yellow on part of antennae. Stridulating structures weakly developed (Fig. 15) 3
2′. Antennae entirely black. Stridulating structures well developed (Figs. 16–17) 4

3(2). Basal portion of antennae yellow (Mexico to Costa Rica) ..... *C. colorata*
3′. Distal portion of antennae yellow (Acapulco, Mexico) ..... *C. minuta*

4(1′). Membrane of tegmina dark brown to black with strongly contrasting straw-colored veins (inland south central Brazil) ..... *C. nuptialis*
4′. Not as above 5

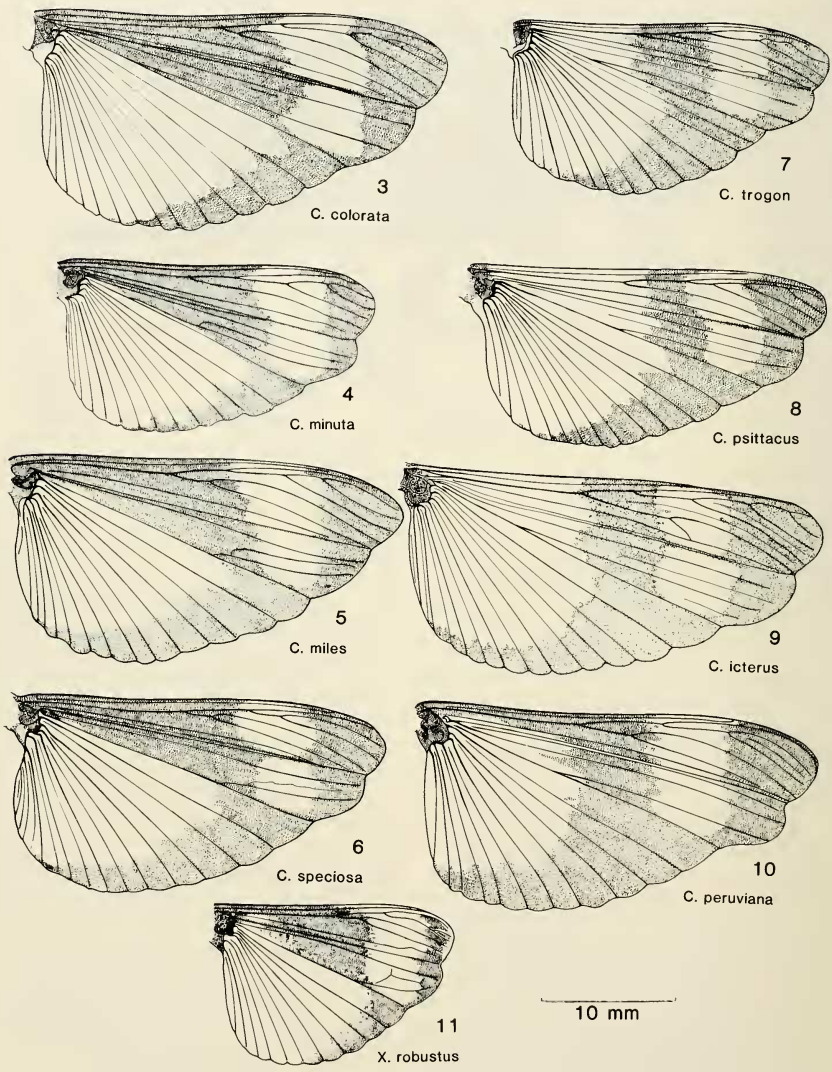
5(4′). Posterior yellow margin of pronotum interrupted by black or green at angle between disc and lateral lobes. Rim of coxal articulation on mesathorax and metathorax entirely or partially yellow (South America) ..... *C. speciosa*
5′. Posterior yellow margin of pronotum not interrupted at angle between disc and lateral lobes. Rim of coxal articulation on mesathorax and metathorax entirely green (southeastern Mexico) ..... *C. miles*

6(1′). Antennae entirely black 7
6′. Antennae with yellow tips 10

7(6). No bands on hind tibiae 8
7′. Yellow bands on hind tibiae 9

8(7). Yellow bands lacking on all legs (Costa Rica) ..... *C. trogon trogon*
8′. Yellow bands on hind femora (Guatemala, Belize, and Honduras) ..... *C. trogon intermedia*

9(7′). Proximal yellow band on hind femora interrupted on outer ventral portion (Costa Rica to northern Colombia and Venezuela) ..... *C. psittacus psittacus*
9′. Proximal yellow band on hind femora



FIGURES 3–11. Male hind wings of seven of the eight species of *Chromacris* (3–10) *C. nuptialis* being omitted because of similarity to *C. speciosa* (6), and *Xestotrachelus robustus* (11), all at same scale and from the following localities: (3) *colorata* Medellin de Bravo, Veracruz, Mexico; (4) *minuta* Acapulco, Guerrero, Mexico; (5) *miles* Boloyuc, Quintana Roo, Mexico; (6) *speciosa* Aratinga, Rio Grande do Sul, Brazil; (7) *trogon* San Lorenzo, Alajuela, Costa Rica; (8) *psittacus* Cabima, Panama; (9) *icterus* Tabatinga, Amazonas, Brazil; (10) *peruviana* Satipo, Junín, Peru; (11) *X. robustus* Cerro Corá, Amambay, Paraguay.

entire (western Colombia and western Ecuador) ..... *C. psittacus pacificus*

10(6'). Hind tibiae with single, distal, yellow band (southeastern Colombia to northeastern Peru) ..... *C. icterus*

10. Hind tibiae with two yellow bands (Peru) ..... *C. peruviana*

Chromacris Walker

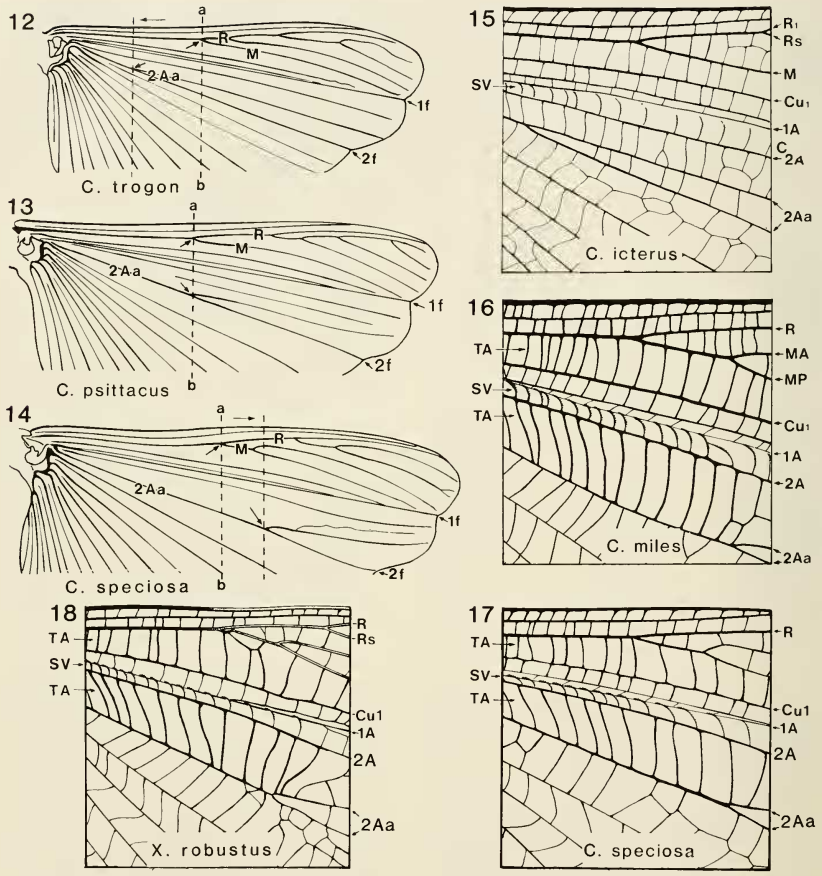
Chromacris WALKER, 1870:643. [Type-species *Gryllus speciosus* Thunberg, 1824, by subsequent designation of Rehn 1904:532.]

DIAGNOSIS.—Neither pronotal crest nor protruding fastigium present; fully alate (Fig. 1). Medium size, body length of females 33 mm (*C. minuta*) to 55 mm (*C. icterus* and *C. peruviana*). Glossy olive-green to dark green with contrasting yellow or yellow tinged with red markings. These markings may be much reduced as in Peruvian specimens of *C. speciosa*. Hind wings various shades of red, orange, or yellow with contrasting black pattern (Figs. 3–11) characteristic of this genus and *Xestotrachelus*, distinguishing them from all other genera of subfamily. Genitalia (Figs. 19–26) rather uniform throughout the genus. Noteworthy are weakly developed aedeagal valves.

CLASSIFICATION.—Two groups of *Chromacris* can be recognized. One group including *trogon, psittacus, icterus,* and *peruviana* (trogon group) have the proximal half of the first two plaits of the hind wings without black on the anterior portion of first two plaits (Fig. 10). In contrast, first two plaits of group containing *colorata, minuta, miles, speciosa,* and *nuptialis* (colorata group) are entirely black (Figs. 3–6). Aedeagal valves of trogon group are externally sclerotized (Fig. 22–25) whereas those of the colorata group are small membranous lobes (Figs. 19, 20). Trogon group members commonly have yellow wings, occasionally orange, and rarely red. Wings of colorata group members are commonly red, orange in some geographical areas, and frequently yellow in part of Atlantic coastal area of Brazil. In the trogon group, prosternal tubercle small and pointed with concave sides as seen in profile. In contrast, *C. miles, C. speciosa,* and *C. nuptialis* have a large, bluntly pointed tubercle that is variable in form, even intra-specifically. On the other hand, tubercle of *C. colorata* and *C. minuta* more nearly resembles that of the trogon group in its small size, may be pointed, but sides in profile are rarely concave. *C. miles* and its two closely related species, *C. speciosa* and *C. nuptialis,* have a well-developed stridulatory apparatus, as in many other species of the Romaleinae. The serrate cross veins (SV) between the first (1A) and second (2A) anal veins of the second plait (Figs. 16, 17) contact the raised scraper veins on underside of tegmen when wings are folded. Tympanate or fenestrate areas (TA) on either side of these cross veins are well developed as resonators. This stridulatory apparatus is more weakly developed in other species of *Chromacris* and, in many cases, may not be functional. For example, compare the wing of *C. icterus* (Fig. 15) with those in Figures 16 and 17. In summary, the trogon group is distinguished from the colorata group by the aedeagal valves and black pattern of hind wings, and the colorata group is divided into two subgroups by shape of prosternal tubercle and stridulatory apparatus.

Recognition of species in the genus *Chromacris* has been difficult because of the lack of morphological characters and dependence on color and color pattern. The trogon group of four species, including two subspecies, can be reasonably well defined by a combination of different color-pattern characters (Table 2). The illustrations of the aedeagus of this group (Figs. 22–25) may suggest species differences, but individual variation is such that clear distinctions between species are not evident. The wide-ranging *C. speciosa* of South America has been most puzzling because of the great amount of geographical variation of color and color pattern and variation within a local population. It has been difficult to decide whether we are dealing with species, subspecies, or just color forms. As an example of color forms, about half of the 21 specimens of *C. speciosa* recorded from Floresta de Tijuca near Rio de Janeiro, Brazil, have yellow wings and the other half orange wings, with no intermediates. We have concluded that it is most practical to treat *C. speciosa,* at least for the present, as but one highly variable species. We need more information on *C. miles* and *C. nuptialis* to understand their status as species and their relationship to *C. speciosa.*

GENERAL OBSERVATIONS.—Most of the available data for the genus refer to *C. speciosa*. The biology of this species was studied in Tucumán,



FIGURES 12–14. Male hind wings of three species of *Chromacris* showing relative position of radius (R) median (M) fork to the second anal accessory (2Aa) fork. The 2Aa fork is more distant from the base of wing than the R-M fork in *C. speciosa* (Fig. 14) and its related species, *C. miles* and *C. nuptialis*, whereas in *C. trogon* and *C. psittacus* (Figs. 12 and 13) and all other species of the genus, the 2Aa fork is equidistant or closer to base of wing than the R-M fork. The 1f is the first and the 2f is the second fold line of wing.

FIGURES 15–18. Details of stridulatory area of male hind wings of three species of *Chromacris* (Figs. 15–17) and *Xestotrachelus robustus* (Fig. 18). Note well-developed tympanate areas (TA) in Figs. 16–18. Terminology of wing venation follows Ragge (1955). SV, serrate veinlets or cross veins; TA, tympanate or fenestrate areas; R, radial vein; Rs, radial sector; Cu1, first cubital vein; 1A, first anal vein; 2A, second anal vein.

Argentina, by Barrera and Turk (1977). Data on the biology of *C. colorata* have been reported from Monterrey, Mexico, by Pretto-Malca (1968), at the other extreme for the distribution of the genus. Some data on the food of other species exist, mainly in papers of applied entomology. Some aspects of the general biology of the species of the genus, such as their general

preference for solanaceous and composite plants and the gregariousness of their juveniles, are generally known by all entomologists who have collected these insects in the field.

OVIPOSITION AND DEVELOPMENT.—Eggs of *C. speciosa* are laid in the soil, the top of the egg-pod 10 to 20 mm under the surface. Eggs are cemented together in the pods, but not embedded in the frothy secretion which covers the egg-pods of other acridoids. This secretion just forms the upper half of the pod, while the egg-mass is bare and usually 15 mm long, 8.5 mm wide. The number of eggs in each pod varies between 61 and 70, with a mean of 66 eggs (Barrera and Turk 1977). This species grows from hatching to imago, under the Tucumán climate, in 30 to 60 days, passing through five instars in the male and six instars in the female. Nymphs are black with red and some white markings. Sexual maturity is attained 10 days after the last molt. Adults mate repeatedly and females lay at least two pods. The insects usually disperse after reaching the imaginal stage (Turk and Barrera 1976). Pretto-Malca (1968) stated that egg-pods of *C. colorata* contain an average of 35 eggs and that the insect reaches the imaginal stage through six nymphal instars, and sexual maturity about 18 days later. Nymphs of this species are highly gregarious.

FOOD PLANTS.—*Chromacris speciosa* prefers solanaceous plants. Turk and Barrera (1976) reported its feeding on *Cestrum parqui, C. strigillatum, C. lorentziana, Lycium cestroides, Solanum argentinum* and *S. verbascifolium* (Solanaceae), and also on *Verbesina encelioides* (Compositae) and alfalfa (*Medicago sativa,* Leguminosae). They bred to maturity nymphs of this species found on alfalfa, using only this plant for food, and development was normal. They reported that in laboratory breedings nymphs which were first fed on *Lycium cestroides* readily changed to other species of *Lycium,* but would starve to death rather than accept *Solanum* or genera of other plants. Conversely, nymphs started on *Solanum* would not accept *Lycium.* Thus, food plants, at the generic level, are determined by the first food of the newly hatched nymphs. The same feeding experiments demonstrated that this species would not eat species of the grass family (Turk and Barrera 1976). Carrasco (1962), however, reported *C. speciosa* and another unidentified species (evidently *C. peruviana* according to Carrasco's description) feeding on rice plants and doing considerable damage to this crop in Peru. Guagliumi (1973) mentioned *C. speciosa* as feeding on sugar cane in northeastern Brazil. Astacio-Cabrera (1975) reported *C. colorata* in Nicaragua on the composite *Baltimora recta,* and Pretto-Malca (1968) has stated that this species in Mexico usually feeds, and has been bred on, *Solanum elaeagnifolium.* Rowell (1978) reported the Solanaceae as the preferred food of *C. trogon* in Costa Rica.

BEHAVIOR.—The gregarious stages of *Chromacris,* which are usually seen forming large groups on the tops of their food plants, together with their bright and contrasting coloration suggest that they are unpalatable or poisonous to predators and that their coloration is premonitory. One of us (H.R.R.) recently observed 20 to 30 conspicuous nymphs on top of a tussock of grass two or three meters from a small solanaceous shrub stripped of its leaves, which suggests that the gregarious behavior is a part of the premonitory defense. After reaching the imaginal stage, these insects tend to disperse. Adults are very visible during flight, but once they alight on vegetation, they seem to disappear after the display of their colorful wings suddenly ceases.

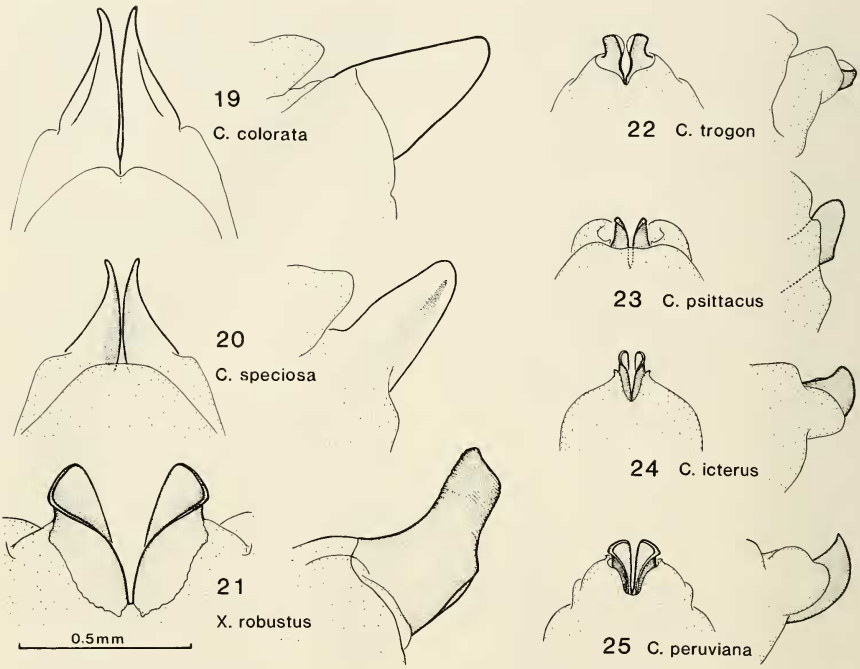
HABITAT.—The species of this genus are usually found at forest edges and clearings, roadsides, edges of cultivated fields, and nearly all places where herbaceous solanaceous and composite plants occur. They seem to avoid heavy forest and prairie habitats.

1. **Chromacris colorata** (Serville)

Acridium coloratum SERVILLE, 1839:674. [Holotype, MNHN, no longer extant, said to come from South Carolina, USA, obviously in error. Mention of the 8–10 basal segments of the antennae as yellow and others black clearly indicates that it is the Mexican species.]

Rhomalea pedes SAUSSURE, 1859:392. [Lectotype, ♂, Geneva Museum; Mexico. So labelled by C.S.C. and here designated.]

DIAGNOSIS.—Eight to 12 proximal segments of antennae yellow, distal segments black—a unique color pattern for the genus. Posterior margin of the pronotum yellow, but no yellow patches on midportion of lateral lobes, as is usual in *C. speciosa.* Three yellow bands on hind femur and only one distal band on hind tibia. Middle leg with one band on tibia, femur, and



FIGURES 19–25. Dorsal and lateral views of aedeagi. Figs. 19 and 20 are examples of *colorata-miles* group. Figs. 22–25 are examples of *trogon* group. Fig. 21. *Xestotrachelus robustus* from Cerro Corá, Amambay, Paraguay. Fig. 19. *Chromacris colorata* from Medellin de Bravo, Veracruz, Mexico. Fig. 20. *C. speciosa* from Resistencia, Chaco, Argentina. Fig. 22. *C. trogon* from San Lorenzo, Aulajuela, Costa Rica. Fig. 23. *C. psittacus* from Las Pavas, Santa Marta Mts., Colombia. Fig. 24. *C. icterus* from Villavicencio, Colombia. Fig. 25. *C. peruviana* from Aucayacu, Huánuco, Peru.

trochanter. Fore legs with one band on tibia. Hind wings rich cherry-red, with black pattern (Fig. 3) similar to that in *C. speciosa*. Prosternal tubercle tapers to a narrow point, much as in *C. psittacus* and other yellow-winged species. The small, short aedeagus formed by a pair of papillose, flattened lobes (Fig. 19) slightly sclerotized internally. Aedeagus similar to others of the colorata group.

DISTRIBUTION.—Tropical humid areas of Mexico south to Costa Rica. Of common occurrence July to September.

SPECIMENS.—**Mexico.** States of Nuevo León, Tamaulipas, San Luis Potosí, Veracruz, Oaxaca, Guerrero, Morelos, Jalisco, Nayarit, Sinaloa, and Yucatán.

Guatamala. EL PETÉN: 3 mi [4.8 km] S Tikal, 16 Aug. 1974 (J. C. Lee), 6♂, 3♀. 22 mi. [35 km] NW Poptun, 15 Jul. 1974 (J. C. Lee), 1♂, 3♀.

Belize. Río Grande, Aug. 1931 (J. J. White), 3♀.

Nicaragua. MANAGUA: Sep. 1955 (E. Morales-Agacino), 2♂, 1♀, CSC.

Costa Rica. GUANACASTE: Cañas, Sep. 1965 (C. H. F. Rowell), 1♂, 1♀, CHFR.

COMMENTS.—Specimens from Volcán Colima (Jalisco, Mexico) and Guanacaste (Costa Rica) agree with Serville's description of *Acridium coloratum* in lacking any banding on fore and middle legs and on hind tibia, and much reduced banding on hind femora. The type-specimen of *Rhomalea pedes* has fully banded legs, as have most Mexican specimens. Costa Rican specimens show small yellow marks on the prozonal part of the lateral lobes of the pronotum, as is

also true of some specimens of *C. speciosa*. These Costa Rican specimens also have 12 segments of the antennal flagellum yellow, the following 4 segments part black and part yellow, and only the tip of the antennae entirely black. The Costa Rican specimen has no yellow on posterior margin of pronotum.

2. **Chromacris minuta** n.sp.

DIAGNOSIS.—Six to eight apical antennal segments yellow, other segments black. Hind wings orange-red rather than cherry-red as in *C. colorata*. Body color pale olive-green with greatly reduced yellow markings. No yellow bands on legs except weakly developed proximal and median bands on hind femur. Prosternal tubercle short and conical. End of aedeagus much as in *C. colorata*. Body size small for the genus, males 26–31 mm, females 35–39 mm from fastigium to end of wings.

SPECIMENS.—**Holotype:** ♂, ANSP, Acapulco, Guerrero, Mexico, 13 Aug. 1935 (H. R. Roberts, E. R. Helwig).

Paratypes: Mexico. GUERRERO: 5 mi. [8 km] N Acapulco, 15 Sep. 1940 (C. Bolivar, H. R. Roberts), 7♂, 1♀. Same data as for holotype, 6♂, 8♀, 3 juv.

COMMENTS.—This species is most similar to *C. colorata*. It should be looked for elsewhere along the Pacific coast of Mexico. A female of *C. colorata* from between Tierra Colorada and Río Papagayo, about 40 km north of Acapulco, shows some reduction of yellow banding of the legs as occurs in *C. minuta*, but in other respects is typical of *C. colorata*.

3. **Chromacris miles** (Drury)

Gryllus locusta miles DRURY, 1773:79, pl. 42, fig. 2. [Holotype, ♀, not found in British Museum or Oxford collections, but excellent figure should suffice; "Bay of Honduras."]

DIAGNOSIS.—Red wing pattern (Fig. 5) similar to that in *C. colorata* and others of the colorata group. Resembles *C. colorata* in lacking yellow in middle area of lateral lobe of pronotum. This condition occurs rarely in *C. speciosa*. Similar to *C. speciosa* in having entirely black antennae and two yellow bands rather than one on hind tibiae, but differs in having yellow on hind margin of pronotum interrupted by black or green only on midline, whereas in *C. speciosa* it is interrupted on midline and both sides at the angles that limit disc from lateral lobes of metazona. Also, in *C. miles* rim of coxal articulation on mesathorax and metathorax green, whereas it is entirely or partially yellow in *C. speciosa*.

SPECIMENS.—**Mexico.** QUINTANA ROO: 5 mi. [8 km] SE Polyuc (Boloyuc), 28 Jul. 1960 (P. M. Litchfield), 1♂, UMMZ. VERACRUZ: Laguna Verde, Aug. 1974 (M. Descamps), a small series of males and females, MNHN.

COMMENTS.—It has been thought that Drury's name should be applied to Thunberg's South American species, *C. speciosa*. Finding specimens from Veracruz and the peninsula of Yucatán which closely match Drury's figure supports the existence of a distinct species in the Bay of Honduras region. Based on the black pattern of the hind wings, this species belongs to the colorata group and is closest to *C. speciosa* in the strong development of the stridulatory areas on the hind wing. Its color pattern is also more similar. *C. speciosa*, however, does not occur north of Colombia, and *C. miles* occurs within the range of *C. colorata*. More information on the distribution of the genus in this region is needed to clarify our understanding of Drury's species.

4. **Chromacris speciosa** (Thunberg)

Gryllus speciosus THUNBERG, 1824:404. [Lectotype, ♀, so labelled by C.S.C. and here designated; two male syntypes also examined; Uppsala Museum; Brazil].

Acridium xanthopterum HAHN, 1835, table A, fig. 2. [Holotype unknown; Brazil. Hahn attributes the name to Perty in "Ins. nov bras.," but no such reference has been found. Black pattern of hind wing shown in illustration identifies it as the yellow-winged form of this species. New synonym.]

Rhomalea stolli PICTET AND SAUSSURE, 1887:351. [Lectotype, ♂, so labelled by C.S.C. and here designated; Geneva Museum; Bahia, Brazil. Synonym by Kirby 1910:373.]

DIAGNOSIS.—Varies geographically and locally. Red winged over most of its range, but in lowland coastal area from Bahia, Brazil, to Uruguay, wings are frequently orange or yellow, and tegmina tend to be green rather than green tinged with red. Yellow-winged individuals readily distinguished from the typically yellow-winged species of the trogon group by entirely black basal half of the first two plaits (anterior or first paired fold of wing) (Fig. 6). In Paraguay, Argentina, and Uruguay wings tend to be orange-red, and yellow markings are tinged with red. In Bolivia, Peru, and Ecuador reduction and variation in leg banding evident. Elsewhere, hind femur almost always has three pale bands and the hind tibia two pale bands. Specimens from Ecuador and Peru lack hind tibial bands,

TABLE 1. VARIATION IN BANDING OF HIND FEMUR OF *Chromacris speciosa* (22 specimens from Ecuador and Peru, 60 specimens from Santa Cruz, Bolivia).

	Banding of hind femur					
	Ecuador, Peru			Bolivia		
	Strong	Weak	Absent	Strong	Weak	Absent
Proximal	17	5	—	40	20	0
Median	—	10	12	5	37	18
Distal	—	1	21	27	3	30

and hind femur usually has a strong proximal band, median band may be weak or absent, and distal band nearly always absent. Some 60 specimens from city of Santa Cruz region of eastern Bolivia show great variation in presence or absence of various bands. Hind tibia may have a distal band or none. Hind femur usually has strong proximal band; it is never absent; median band usually weakly developed; distal band may be strongly developed (Table 1). Also, in the Andean region north to Ecuador, body color and tegmina darker.

SPECIMENS.—Unless otherwise noted all specimens have red hind wings, three yellow bands on hind femur, two yellow bands on hind tibia, and tegmen tinged with red.

Colombia. MAGDALENA: Aracataca, 4–10 Aug. 1920 (Rehn, Hebard), 8♂, 3♀; (3 lack proximal tibial band).

Venezuela. CARABOBO: San Esteban, Nov.–Dec. 1939 (P. Van Duse), 6♂, 7♀. COJEDES: 26 km s jct. Rts. 8 and 13 on Rt. 8, forest, 13 Jul. 1981 (Otte et al.), 1♂, 3♀.

Guyana. Bartica, Dec. 1912 (H. S. Parish), 30♂, 35♀.

Brazil. AMAPÁ: Rio Puxacá, Mazagão, Feb. 1961 (J. C. M. Carvalho), 3♀, UMMZ. Eighteen specimens from Belém, Santarém, Obidos, and Manaus on the Amazon are similar to the Guyana series. PARÁ: Jacareacanga, 6°16′S, 57°44′W, Dec. 1968 (Alvarenga), 3♂, 9♀, UMMZ. BAHIA: 100 km NW Feira de Santana, 13 Mar. 1981 (Roppa, Carbonell, Roberts), 2♂, 2♀; Itabuna, research center, 22 Nov. 1974, cacão forest (Roberts, Carbonell), 1♀; Mucurí, Aug. 1977 (Roppa, Becker), 2♂ (one yellow wings, other orange wings). ESPÍRITO SANTO: Itapemirim falls, 1–6 km E BR. 101, edge of forest and marsh, 5 Dec. 1974 (Roberts, Carbonell), 4♀ (lack usual yellow median spots on lateral lobe of pronotum); 3 km s Linhares, cacão forest, 1 Dec. 1974 (Roberts, Carbonell), 2♂, 1♀ (lack usual yellow spots on lateral lobe of pronotum). RIO DE JANEIRO: Floresta de Tijuca, Jan. 1981, 4♂, 6♀ (yellow wings), 5♂, 6♀ (orange wings); BR. 101, 1 Feb. 1974 (D. Otte), 2♂ (yellow wings, tegmina lack red tinge); Petropolis, 12 Apr. 1913 (M. Burr), 2♂ (yellow wings, tegmina lack red tinge). MINAS GERAIS: Viçosa, 9 Aug. 1938 (B. T. Snipez), 2♀ (yellow wings, tegmina lack yellow tinge); 46 km SE Itajuba, 1400 m, 21 Mar. 1980 (Roppa, Carbonell, Roberts), 3♂, 3♀. GOIÁS: betw. São Simão and Jataí, 5 Mar. 1980 (Roppa, Carbonell, Roberts), 1♂, 2♀; 15–30 km E Mineiros, 7–9 Mar. 1980 (Roppa, Carbonell, Roberts), 1♀. SÃO PAULO: 10 km W São João de Boa Vista, 19 Mar. 1980 (Roppa, Carbonell, Roberts), 30♂; Franca, Jan. 1911 (E. Garbe), 1♂, 1♀; Salto Grande, Feb. 1911 (H. Luderwaldt), 1♂; Cubatão (Alin), 2♂, 1♀ (orange wings, tegmina lack red tinge); Piracicaba, 1♂ (orange wings). PARANÁ: 24°38′S, 54°07′W, 500 m, Mar. 1965, "virgin deciduous forest (no Araucaria) with many palms (Euterpe etc.), no grass, under growth of ferns and other plants" (F. Plaumann), 4°, 19♀, UMMZ; Curitiba, 13 Feb. 1941 (J. R. Bailey), 1♂, 1♀, UMMZ (male has orange wings, lacks red tinge on tegmina). SANTA CATARINA: Nova Teutonia, 27°11′S, 52°23′W, 6 km sw Seara, 300–500 m, 1961–1964 (F. Plaumann), 6♂, 5♀, UMMZ; Corupa, Jan.–Mar. 1956–1962 (Anton Maller), 3♂, 9♀, UMMZ (1♂, 5♀ have red wings, 2♂ lack red tinge on tegmina, 2♂, 4♀ have orange-yellow wings and lack red tinge on tegmina); Rio Capivari, 1889 (Fruhstorfer), 2♀ [gift of Dr. H. Saussure, ANSP, labelled *R. miles* Drury and *Rhomalea speciosa*, probably what Pictet and Saussure considered to be *R. miles* Var. C, as it has yellow wings; there are two Rio Capivari's in eastern lowlands of Santa Catarina]; Pinhal 700 m, Apr. 1959 (Anton Maller), 1♀ (yellow wings, lacks red tinge on tegmina). RIO GRANDE DO SUL: Aratinga, Feb. 1964 (Carbonell, Mesa, Monné), 1♂ (yellow wings). MATO GROSSO: 40 km E Rodonópolis, 11 Mar. 1980 (Roppa, Carbonell, Roberts) 1♂; 30 km NW Alto Araguaya, 750 m, 10 Mar. 1980 (Roppa, Carbonell, Roberts) 1♂; Chapada near Cuiabá, 4♂, 3♀ (1♂ lacks distal band on hind femur); Corumbá, Urucum, 22–29 Dec. 1919 (R. G. Harris), 12♂, 12♀ (proximal median bands weak, distal band strong on hind femur, proximal tibial band usually absent); Tres Lagos, 6–10 Dec. 1919 (Harris), 4♀ (hind legs fully banded, and one of these with yellow markings strongly tinged with red), 1♀ (distal band on hind femur and hind tibia only). MATO GROSSO SUL: 30–60 km E Aquidauana, 16 Mar. 1981 (Roppa, Carbonell, Roberts), 2♂.

Uruguay. Whole country, Dec.–Apr., large series, CSC (yellow markings tinged with red).

Ecuador. Balzapamba (R. Haensch), 1♂ (weak proximal band on hind femur). Putumayo Dist., La Sombra to El Encanto, 23 Aug. 1920, 1♂ (strong proximal and weak median band on hind femur).

Peru. JUNÍN: Satipo, 15 Nov. 1945 (P. Paprzycki), 1♂, 8♀; Satipo, 650 m, Jul. 1940 (Schunke) 1♀; Col. Perené, El Campamento, 22 Jul. 1920, 2♀; Chanchamayo, 1♂, 1♀; Vilcanota, 1♀; Puerto Yessup, Feb. 1930 (M. A. Carriker), 1♀. CUZCO: Valle de Urubamba, Sahayaco, 800 m, 7 Dec. 1947 (Weyrauch), 4♂; Prov. La Convención, Sangobatea, Jan. 1976 (J. S. Escalante), 3♂, 3♀, JAE; Prov. Paucartambo, Salvación, Oct. 1968 (F. Carrasco), 1♀, FCZ. All Peruvian specimens have moderate to well-developed proximal bands, weak to no median bands, and no distal bands on hind femur; no bands on hind tibia and other legs.

Bolivia. SANTA CRUZ: Province of Sara, 450 m, Jan. 1918 (J. Steinbach), 19♂, 27♀ (35 had no tibial banding, 11 had weak distal yellow bands; on hind femur all had weak to strong proximal bands, 14 had no median bands, 22 had weak to strong distal bands, and 24 had no distal bands) [Note: this previously recognized Province of Sara, bounded in part by the Río Grande or Guapay and the Río Mamoré or Ichilo, is the region where Steinbach did much of his collecting, and included the town of Buena Vista (where his relatives lived and where a niece presently operates a small restaurant, store, and inn), Portachuelo, and the city of Santa Cruz, that is, Santa Cruz de la Sierra.]; Buena Vista, May 1917 (Steinbach), 2♂, 1♀; between Buena Vista and San Carlos, 350 m, cacão forest, 21 Feb. 1976 (Ronderos, Roberts) 2♂, 1♀; between Buena Vista and Portachuelo, 20 Feb. 1976, 1♀ (specimens from last three localities similar in variation to those from

Prov. of Sara; Santa Cruz de la Sierra, Feb. 1922 (J. Steinbach), 5♂, 6♀; 18 km sw Santa Cruz, 400 m, 16 Feb. 1976 (Ronderos, Roberts), 3♂, 2♀ (of last 16 specimens, 15 had a strong distal band on hind femur, 1♂ lacked this band); Prov. of Nuflo de Chávez, Ascención, 15°42'S, 63°05'W, 500 m, Nov. 1963 (Walz), 4♂, 5♀ (5 had distal and 4 had no distal band on hind femur). See Table 1 for a summary of this banding.

Paraguay. 26 specimens from Villa Rica, Jan., Feb.; Sapucay, Jan.–Apr.; Horqueta, Dec., Jan. (yellow markings strongly tinged with red; hind femur with three bands, hind tibia with two bands).

Argentina. 102 specimens from 24 localities in the provinces of Jujuy, Feb.; Salta, Mar.; Chaco, Feb.; Misiones, Dec., Feb.; Tucumán, Mar.; Catamarca, Mar.; Córdoba, Mar.; Entre Ríos, Mar.; La Rioja, Feb.; Mendoza Feb.–Apr.; San Luis, Jan.; Buenos Aires, Feb. As in Paraguay and Uruguay, yellow markings are strongly tinged with red; hind femur with three bands, hind tibia two bands. Adults may be found December to April.

COMMENTS.—Unlike other species of the genus, no consistent differences have been found to distinguish various geographical developments. Comparing specimens, for example, from Carabobo, Venezuela, with those from Santa Cruz, Bolivia, or Corupá, Brazil, it is evident that considerable geographic differentiation occurs, but it does not seem possible or practical with our present evidence to recognize subspecific elements of the species.

5. **Chromacris nuptialis** (Gerstaecker)

Rhomalea nuptialis GERSTAECKER, 1873:185. [Holotype, ♂, bearing label with number 2008, and ♀ allotype, Berlin Museum; Saltogrande (Sellow). The locality of Salto Grande of Sellow is uncertain. Sellow visited Salto Grande on the Uruguay River (Department of Salto, Uruguay), but none of the species he labelled Saltogrande has ever been found in Uruguay or the adjacent Brazilian state of Rio Grande do Sul. Sellow's Saltogrande is very probably that on the Paranapanema River in the state of São Paulo. Types examined.]

Rhomalea latipennis PICTET AND SAUSSURE, 1887:351. [Holotype, ♂, Geneva Museum; Brazil. It does not have a locality label but bears the number 477-56, which in the museum records corresponds to Brazil, collected by Ferrier circa 1856. We have been unable to trace the collector's route in Brazil. Holotype examined. New synonym.]

DIAGNOSIS.—Coloration highly variable, including individuals with pale yellow and pale red wings. Body and legs with yellow or red markings (irrespective of wing color). Antennae black. Pattern of hind wings as in *C. speciosa*. Tegmina very characteristic, membrane dark brown to black, strongly contrasting straw-colored veins. Fore and middle legs without transverse bands, ground color variable from greenish yellow to reddish brown; longitudinal series of black spots, sometimes coalescing into black streaks. Hind femora black to dark brown, with longitudinal carinae and fishbone pattern of a lighter color, variable from reddish brown to straw-yellow; transverse bands absent or very slightly marked, only exceptionally, plainly visible, proximal one on upper half only, median one may be complete, distal one always absent. Proximal and median bands always visible on inner and lower surfaces of hind femur as conspicuous yellow or red areas, no trace of distal one. Hind tibia generally dark colored, especially on inner side, transverse bands generally absent, sometimes faintly marked, the distal one, proximal one, or both may be visible in different specimens. Prosternal tubercle relatively slender, long, and curved rearwards.

DISTRIBUTION.—Inland south-central Brazil, including southern Goiás, western Minas Gerais, western São Paulo, and northwestern Paraná.

SPECIMENS.—**Brazil.** D.F.: Brasília, Nov. 1963 (N. Tangerini), 2♂ (yellow wings), CACS. GOIÁS: rodovia Anapolis–Brasília, km 63, 17 Feb. 1964 (H. M. Canter), 1♂ (yellow wings), MZSP; betw. São Simão and Jataí, 5 Mar. 1980 (Roppa, Carbonell, Roberts), 1♀ (red wings), CACS; Minieros, Feb. 1975 (Roppa, Silva), 1♀ (red wings), CACS. MINAS GERAIS: Uberaba, Feb. 1979 (Roppa, Silva), 1♂ (red wings), CACS; Diamantina, Mar. 1956 (D. Albuquerque), 1♀ (red wings), CACS; Lagoa Santa, Jul. 1965 (M. S. Morgante), 1♂ (yellow wings), MZSP. PARANÁ: Vila Velha, Jan. 1975 (C. Valle), 1♂, 1♀ (yellow wings), MZSP.

COMMENTS.—Individuals of this species are highly variable in color, and therefore difficult to identify. However, the only other species known from the area is *C. speciosa*, from which it can be separated by the peculiar coloration of its tegmina, the very different color on pronotum and legs, and the form of its pronotal tubercle. The species appears to be uncommon, being always represented by one or two specimens from each locality, which is unusual for species of this genus. Possibly, this taxon is a highly aberrant variation of *C. speciosa* in the middle of whose territory it occurs, but the constancy of some of its characters seems to indicate that it is a distinct species.

6. **Chromacris trogon trogon** (Gerstaecker)

Rhomalea trogon GERSTAECKER, 1873:186. [Holotype, 1♀, Berlin Museum; Costa Rica. (Gerstaecker noted that hind legs were lacking. A bright yellow marked leg was later attached and now removed. Holotype examined.]

DIAGNOSIS.—Hind wings yellow to orange-yellow, and lack black on anterior basal half of first two plaits (Fig. 7). Antennae entirely black. No yellow banding on legs, although often faint pale green bands present on hind femora (Table

TABLE 2. DIAGNOSTIC CHARACTERS FOR THE SPECIES AND SUBSPECIES OF THE TROGON GROUP OF GENUS *Chromacris*. A band that does not extend entirely around the hind femur is listed as a half band.

Name	Range	Antenna	Basal ½ of wing	Pronotal metazona	Hind femur	Hind tibia
t. intermedia	N Guatemala to Honduras	all black	all yellow	no yellow	3 half bands	no bands
t. trogon	Costa Rica	all black	all yellow	no yellow	no bands	no bands
p. psittacus	Costa Rica to N Colombia, N Venezuela	all black	all yellow	no yellow	2 and ½ bands	2 bands
p. pacificus	W Colombia, W Ecuador	all black	all yellow	no yellow	3 bands	2 bands
icterus	E Colombia to NE Peru, NW Brazil	tip yellow	all yellow	yellow patches	3 bands	1 band
peruviana	Peru	tip yellow	plait 1 black	yellow patches	3 bands	2 bands

2). Reproductive structures and prosternal tubercle similar to those in *C. psittacus* and other yellow-winged species of the trogon group.

DISTRIBUTION.—Costa Rica and questionably Nicaragua.

SPECIMENS.—**Costa Rica.** Pozo Azul, Río Perris or Parrita (forested foothills of Pacific coastal plain), May 1902 (M. A. Carriker), 2♂, 1♀; 22 Aug. 1927 (Lankester and Rehn), 3♂, 1♀. Between La Unión and Buenos Aires, Terraba Valley, 5500 ft. [1670 m], May 1935 (Lankaster), 1♀. Juan Viñas, 3300 ft. [1000 m], Mar. 1902 (L. Beamer), 1♂, 1♀; 27 Jun. 1909 (P. P. Calvert), 1♂, 1♀. Peralta, 8 Aug. 1909 (Calvert), 1♂; May 1923 (Lankester), 1♂. La Emelia near Guapiles, Aug. 1923, Sep. 1927 (Rehn), 4♂. Cariblanca, 600 m (Lankester), 1♀. Parisimina, 5 m, 26 Jul. 1928 (M. Valerio), 1♀. PUNTARENAS: Río Cataratas, near Brujo, Sep. 1979 (Rowell), 1♂, 1♀. ALAJUELA: 5 km s San Lorenzo, Sep. 1979 (Rowell), 1♂, 1♀, CHFR.

Nicaragua. CHONTALES: (Janson), 1♂, 1♀ (poorly preserved but appears to be this species).

COMMENTS.—Although we have no records of *C. trogon trogon* and *C. psittacus* occurring together, it seems possible that they do. For example, we have this species from near Guapiles and *C. psittacus* from Siquirres about 30 km distant in similar lowland forest country.

7. **Chromacris trogon intermedia** n.subsp.

DIAGNOSIS.—Wing orange with no black on basal half of first two plaits, or first paired fold as in *C. colorata*. Antennal segments all black. Hind femur with yellow bands that may be weakly or strongly developed. Hind tibia with no bands. Prominent wide yellow stripe along ventral margin of lateral lobe of pronotum that extends onto cheek of head. Prosternal tubercle short, tapering rapidly to a point. Distinguished from *C. psittacus* by lack of banding on hind tibia, and from the nominate subspecies of *C. trogon* by banding on hind femur (Table 2).

DISTRIBUTION.—Northern Guatemala, Belize, and Honduras.

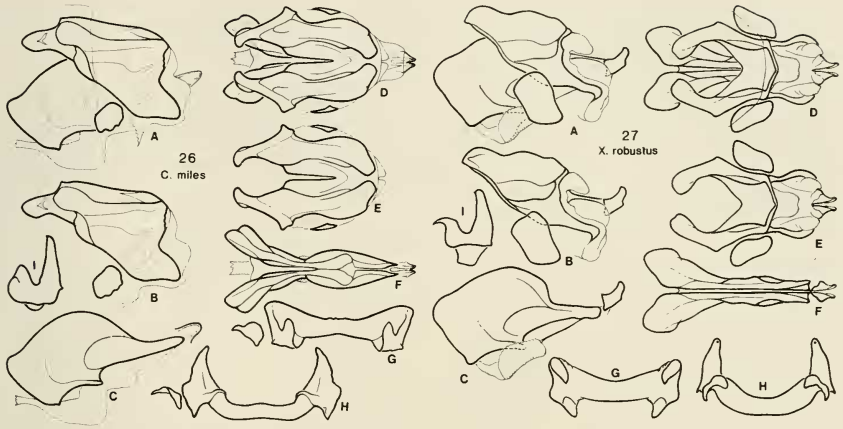
SPECIMENS.—**Holotype:** ♂, ANSP; Honduras, Lancertilla near Tela, Dept. Atlantica, 100–800 ft. (30–250 m), rain forest, 8 Nov. 1930.

Paratypes: Same data as for holotype, 3♀. **Belize.** 50 mi. [80 km] s El Cajo, Mountain Pine Ridge road, 17 Aug. 1960 (P. N. Litchfield), 1♂, 2♀, UMMZ. **Guatemala.** Piedras Negras, 600–800 ft. [180–240 m], 30 Jun. 1933 (D. W. Amran), 1♀.

COMMENTS.—This subspecies is intermediate between *C. trogon trogon* and *C. psittacus* in the reduction in banding of the hind leg, which might suggest that they should be treated as three subspecies, but *C. trogon trogon* and *C. psittacus* occur close together in Costa Rica, though as noted under the subspecies, *C. trogon trogon*, they have not been recorded from the same locality. Specimens from Nicaragua and Honduras are needed to help clarify the problem.

8. **Chromacris psittacus psittacus** (Gerstaecker)

Romalea psittacus GERSTAECKER, 1873:185. [Lectotype, ♂, among four male syntypes with same data, one marked "typus" and here designated; Berlin Museum; Bogotá, Colombia. Species of *Chromacris* probably do not occur in the vicinity of Bogotá. ANSP has specimens of *C. icterus* also labelled Bogotá, and this species actually occurs at lower elevations on the eastern slopes of the Andes.]



FIGURES 26 and 27. Internal male genitalia of *Chromacris miles* from Quintana Roo, Mexico (Fig. 26), and *Xestotrachelus robustus* from Ihú, Caaguazú, Paraguay (Fig. 27). *A*, phallus, lateral; *B*, cingulum, lateral; *C*, endophallus, lateral; *D*, phallus, dorsal; *E*, cingulum, dorsal; *F*, endophallus, dorsal; *G*, epiphallus, dorsal; *H*, epiphallus, frontal; *I*, epiphallus, lateral, left side.

DIAGNOSIS.—Wings yellow to orange-yellow, lacking black on anterior basal half (Fig. 8). Antennae all black. No yellow on dorsum of metazona of pronotum. Hind femur with three yellow bands, but proximal band not entire. Hind tibia with two bands. For comparison with other species see Table 2.

SPECIMENS.—**Costa Rica.** Siquirres, 3 Jul. 1903 (M. A. Carriker), 7♂, 1♀. Ujarass de Terraba, 10 Sep. 1907, 1♂. Monte Verde, "summer," 1928 (F. G. Wallace), 1♂, 1♀. Castilla Farm, lower Río Reventazon, 29 Jul. 1936 (C. W. Dodge), 1♂.

Panama. Gatún, Jul.–Aug. 1916 (D. E. Harower), 8♂, 3♀. Cabima, 24 May 1911 (August Busck), 2♂, 1 juv. Barro Colorado Island, C.Z., 22 Jul. 1933 (H. H. Hood), 1♀.

Colombia. CUNDINAMARCA: Las Mesitas, Sep. 1915 (A. Maria), 1♂, 3♀.

Venezuela. ZULIA: Kasmera, Río Yasa, Sierra de Perija, 250 m, 19 Sep. 1961, 2♂, 3♀, Universidad Central, Instituto de Zoologia Agricola, Maracay.

COMMENTS.—Evidently seasonal. One of us (H.R.R.) visiting Costa Rica for several years in the Pacific and Caribbean lowlands during February and March never encountered this species or *C. trogon*. Most of our records suggest that it occurs commonly May to September.

9. **Chromacris psittacus pacificus** n.subsp.

DIAGNOSIS.—Similar to *C. psittacus psittacus* except proximal yellow band on lower portion of hind femur entire rather than interrupted. See Figure 1 and Table 2.

SPECIMENS.—**Holotype:** ♂, ANSP; Ecuador, Dos Puentes, below Naranjapata along the Guayaquil-Quito railway in Chanchan River valley, 1750 ft. [530 m], 15 Mar. 1931 (W. J. Coxey). [Additional information on location of Dos Puentes is added here from Coxey 1927:10.]

Paratypes: Colombia. EL VALLE: Jiménez, 1600 ft. [486 m], 19 Mar. 1907 (M. G. Palmer), 2♂, 1♀; Choco (M. G. Palmer), 1♀. ANTIOQUIA: Andagoya, 1♀; Cordillére, "vers occid. Río Yurumaqui," 1933 (E. Aubert de la Rue), 1♂, 1♀, MNHN. NARIÑO; "entre Guayacana et el Diviso," 80 m, Nov. 1968 (M. Descamps), 1♂.

Ecuador. CHIMBORAZO: Dos Puentes, 1750 ft. [533 m], 11 Jan. 1921 and 15 Mar. 1931 (W. J. Coxey), 5♂, 2♀; Ventura, 1400 ft. [469 m], 10–13 Apr. 1922, 3♂, 3♀. GUAYAS: Bucay, 900 ft. [274 m], 19 Mar. 1922 (G. H. Tate), 1♀. TUNGURAHUA: Ambato, 1♂, MNHN; Balzapamba, near Ambato (R. Haensch S.), 1♂, Berlin Museum.

COMMENTS.—The slight but consistent difference in the form of the proximal yellow band on the hind femur of these specimens warrants subspecific recognition.

10. **Chromacris icterus** (Pictet and Saussure)

Rhomalea icterus PICTET AND SAUSSURE, 1887:353. [Lectotype, ♀, so labelled and here designated, Geneva Museum; Quito, Ecuador.]

Rhomalea opulenta GERSTAECKER, 1889:32. [Holotype, ♀, Zoological Museum, University of Greifswald; São Paulo

de Olivença, Amazonas, Brazil. Holotype examined. New synonym.]

DIAGNOSIS.—Tip of antenna yellow. Anterior, basal portion of hind wing entirely yellow (Fig. 9). Yellow patches on dorsum of metazona of pronotum. Three yellow bands on hind femur. Single proximal band on hind tibia distinguishes species from all others (see Table 2). A large species with relatively long wings; males 30–38 mm, females 40–55 mm from fastigium to wing tips.

DISTRIBUTION.—Southeastern Colombia, eastern Ecuador, northwestern Brazil and northeastern Peru.

SPECIMENS.—**Colombia.** BOGOTÁ: (so labelled but probably in error) (A. Maria), 2♂, 4♀. CUNDINAMARCA: Susumuco, Feb., Sep. 1916, 1917 (A. Maria), 3♂, 2♀. META: Villavicencio, May, Jun. 1919 (A. Maria), 2♂, 2♀. PUTUMAYO: "bord riviére Mocoa," 800 m, Nov. 1968 (M. Descamps), 1♂, MNHN.

Ecuador. MORONA-SANTIAGO PROV.: S of Méndez, 800 m, 19–21 Oct. 1977 (L. E. Peña), 1♀.

Peru. LORETO: Putumayo District, La Chorrera to La Sombra, 21 Aug. 1920, 1♀; Iquitos, 8 Jan. 1920 (H. S. Parish), 1♀.

Brazil. AMAZONAS: "Hyntanahan" probably Huitanaa, Rio Purus, Jan. 1922 (S. M. Klages), 1♀; Tabatinga, Sep.–Dec. 1977 (L. C. Pereira, B. Silva), long series both sexes, CACS; Eirunepe, Jun. 1950 (J. C. Carvalho), 2♂, 1♀, CACS; Atalaya do Norte, Nov. 1977 (B. Silva), long series, CACS.

11. **Chromacris peruviana** (Pictet and Saussure)

Rhomalea peruviana PICTET AND SAUSSURE, 1887:352. [Lectotype, ♀, so labelled by C.S.C. and here designated from among 1♂ and 3♀ syntypes, Geneva Museum; Peru.]

DIAGNOSIS.—Similar to *C. icterus* in having yellow wings and yellow antennal tips, but differs by having two yellow bands on hind tibiae rather than one (Table 2); differs from all other yellow-winged species by having the black on anterior portion of first plait of hind wings extend to base of wing (Fig. 10). Tegmina relatively long, narrow, and greatly surpassing ends of hind femora; anterior and posterior margins bordered by yellowish or pale green areas. This tegminal coloration is unique for genus.

SPECIMENS.—**Peru.** JUNÍN: Chanchamayo, a district around La Merced in valley below Tarma, 2000–3000 ft. (610–914 m), 1♂; Satipo, near Huancayo, 1650 m, Jul. 1844 (Schunke), 1♂; Mar., Jun. 1944 (P. Paprzycki), 3♀; Puerto Yessup, Feb. 1930 (M. A. Carriker), 1♀. HUÁNUCO: Leonpampa, 110 km E Huánuco, Dec. 1937 (Felix Woytkowski), 3♂, 1♀; Tingo María, 670 m, Sep. 1946 (Weyrauch), 3♀; same locality, 2 Dec. 1954 (E. D. Schlinger, E. S. Ross), 1♀; Divisoria, Cordillera Azul, 1500 m, 1♂, 1♀. LORETO: Río Aguaytia, between Tingo María and Pucallpa, 400 m, Feb. 1961, 1♂, 2♀. SAN MARTIN: Prov. Huallaga, Río Mixiollo, 1200 m, 7 Aug. 1900 (C. A. Baer), 1♀. CUZCO: Paucartambo, Pilcopata, Nov. 1968 (F. Carrasco), 1♂, 1♀; Paucartambo, Atalaya, May 1976 (Descamps, Carbonell), 1♂, 1♀, CACS.

Venezuela. ARAGUA: Nov. 1942, 3♀.

COMMENTS.—The Venezuelan specimens are undoubtedly this species. However, *C. icterus* occurs between this and the Peruvian localities, suggesting the need to confirm the correctness of the locality.

Xestotrachelus Bruner

Xestotrachelus BRUNER, 1913:469. [Type-species *Xestotrachelus hasemani* Bruner (=*X. robustus*) by original designation.]

DIAGNOSIS.—Red and black pattern of hind wings (Fig. 11) closely resembles red-wing species of *Chromacris*, but head and thorax are much more robust, and tegmina may extend well short of, or only slightly beyond, end of hind femora (Fig. 2). Head, pronotum, and other parts of body and appendages may be contrastingly marked with black, pale olive-yellow, and red. Hind tibiae usually red. Phallic structures described under *X. robustus*.

DISTRIBUTION.—Known from Maranhão in northeastern Brazil, Bahia, Espírito Santo, Mato Grosso; Paraguay; and eastern Bolivia.

12. **Xestotrachelus robustus** (Bruner)

Zoniopoda robusta BRUNER, 1911:60. [Lectotype, ♂, here designated, ANSP; Chapada dos Guimarães, Mato Grosso, Brazil. The type-series consisted of a male and female, each labelled as the type.]

Xestotrachelus hasemani BRUNER, 1913:470. [Holotype, ♀, ANSP; labelled as from Galhão, not Calhão as reported by Bruner, Rio Sapão, western Bahia, Brazil. Actually Galhão, 10°35′S, 46°15′W, is in Goiás on the Rio Galhão, and the Rio Sapão is nearby in Bahia. New synonym.]

DIAGNOSIS.—See diagnosis of genus. Extent of black on prozona and mesozona of pronotum variable, may be entirely black, or divided to form two black transverse bands. Extent of red on sides and undersides of abdomen also variable. Easily distinguished from species of *Chromacris* by red hind tibia and lack of banding on hind femur.

Phallic structures generally similar to those in *Chromacris*. Aedeagal valves (Fig. 21) strongly sclerotized, much larger, and sculptured. Rami of cingulum (Fig. 27*B*) narrow, partly surrounding base of aedeagus, strongly bent inward and ventrad near their end, and outer surface at bend covered with small spines. Epiphallus (Fig.

27G–I) similar to that in *Chromacris* except that the ancorae are well developed.

DISTRIBUTION.—See distribution of genus.

SPECIMENS.—**Brazil.** MARANHÃO: Barra do Corda, Feb. 1955, 1♀, CACS. BAHIA: Maracás, Feb. 1963 (F. M. Oliveria), 3♀, CACS. ESPÍRITO SANTO: Linhares, Mar. 1981 (B. Silva), 1♂, CACS. GOIÁS: in addition to the type-locality of *X. hasemani*, 60 km W Mineiros, 10 Mar. 1980 (Roppa, Carbonell, Roberts), 1♂. MATO GROSSO: in addition to the type of *X. robustus*, Corumbá, Urucum, 23–29 Dec. 1919 (R. G. Harris), 4 juv., 18♂, 14♀. MATO GROSSO SUL: 30–60 km E Aquidauana, 16 Mar. 1980 (Roppa, Carbonell, Roberts), 1♂.

Bolivia. SANTA CRUZ: prov. of Sara, 450 m, Jan.–Feb. 1922 (J. Steinbach), 8♂, 16♀; Buena Vista, 500 m, 3 Feb. 1922 (J. Steinbach), 1♀.

Paraguay. CAAGUAZÚ: near Ihú, Mar. 1965 (Carbonell, Mesa, Monne), 1♂, 2♀, CACS. AMAMBAY: Cerro Corá, Jan. 1972 (Descamps, Ronderos, Carbonell), 8♂, 5♀, 1 last instar nymph, CSC.

COMMENTS.—Individual geographic variation in relative tegminal length is evident. In the series recorded from eastern Bolivia, tegmen shorter than or about as long as hind femur. In the series from Corumbá, tegmen slightly or decidedly longer than femur. Tegmen of male from near Aquidauana 19 mm and hind femur 15.5 mm in length, whereas in the male from Mineiros, Goiás, tegmen 16 mm and femur 17 mm. Tegmen of female holotype of *X. hasemani* is 26 mm, hind femur 18 mm. This specimen has a decidedly longer tegmen in proportion to the hind femur than do specimens to the south. It seems possible, however, that populations to be found between this type-locality and those presently observed to the south will be intermediate in relative tegminal length. The aedeagus of the male from Espiríto Santo is relatively shorter and therefore appears to be somewhat broader in lateral view than others examined. The red patch near the end of the hind wing in the longer-winged specimens from Linhares and Maranhão connects narrowly with the large red field of the wing. Conceivably, this modification is the result of the lengthened wing. With more evidence the longer-winged *hasemani* form might be recognized as a subspecies.

Noteworthy is the last instar nymph from Cerro Corá, Paraguay, recorded above, the color of which is well preserved and matches the color pattern of the adult. Unlike the species of *Chromacris* which have a bright but relatively cryptic coloration in the adult stage, *X. robustus* has a much more striking coloration in the adult, which may well serve as a warning to predators. Assuming this is correct, then there would be no need to develop a different coloration in the nymphal stages as in *Chromacris*.

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